



SPECIFICATIONS AND SPECIFICATION WRITING

DETAILED PROSPECTUSES ON REQUEST

BUILDING CONTRACTS, The Principles and Practice of their Administration.

By EDWIN J. EVANS.

The Building Trade has been very liberally supplied with books dealing with its "Technical" or "Constructional" side, but the "Business" or "Administrative" section appears to have been practically neglected. This book is an attempt to satisfy the need in that direction.

CONTENTS: Administration of Contracts—Office Management and General Notes—Book-keeping, etc.—Trade Memoranda and Plant Lists.

EXTRACTS FROM PRESS OPINIONS.

"The book is really an encyclopædia on the subject and one that can be usefully consulted by every contractor in the world. . . . On the whole, this book is the best and most useful for contractors that has ever been published."—*Contractors' Record*.

"A veritable mine of data for the contractor."—*Journal of the Society of Architects*.

"Really excellent . . . we can thoroughly recommend the book."—*Contract Journal*.

Demy 8vo. 320 pages and numerous tables.

Price 10s. 6d. net.

BUILDERS' ESTIMATES AND PRICING DATA, Their Preparation and Analysis.

By HENRY A. MACKMIN, F.S.I., M.R.SAN.I.

The author, who has had a particularly wide experience in all branches of the subject, presents a reasoned and logical treatment of every phase of every branch of the trade. His prices are based on to-day's markets, and a useful tabular scheme enables an adjustment to be made in the event of variation. The volume will be found of equal value to the practising builder and to the student as a text-book, for whose assistance worked examples are introduced.

EXTRACTS FROM PRESS OPINIONS.

"The work is thoroughly sound and can be recommended without hesitation."—*Local Government Journal*.

"The information . . . is eminently practical."—*The Builder*.

"The book may be confidently recommended."—*Contract Journal*.

"We cordially recommend this work . . . full of useful hints and data."—*Illustrated Carpenter and Builder*.

Demy 8vo. 208 pages.

Price 9s. 6d. net.

. The Directly-Useful **D.U.** Technical Series

FOUNDED BY THE LATE WILFRID J. LINEHAM, B.Sc., M.Inst.C.E.

General Editor: JOHN L. BALE

SPECIFICATIONS AND SPECIFICATION WRITING

FOR ARCHITECTS, QUANTITY SURVEYORS, BUILDERS, AND
STUDENTS

BY

R. W. J. DAVIS, P.A.S.I.



LONDON

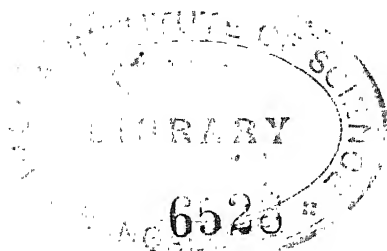
CHAPMAN & HALL, LTD.

11 HENRIETTA ST., W.C. 2

1927

6528

PRINTED IN GREAT BRITAIN
BY THE ABERDEEN UNIVERSITY PRESS
ABERDEEN, SCOTLAND



692.3

N27

FOUNDER'S NOTE

THE DIRECTLY-USEFUL TECHNICAL SERIES is designed to show very strongly the application to actual practice of all work connected with the various subjects dealt with. Technical books of the past have arranged themselves largely under two sections: the theoretical and the practical. Theoretical books have been written more for the training of college students than for the supply of information to men in practice, and have been largely filled with problems of an academic character. Practical books have often sought the other extreme, omitting the scientific basis upon which all good practice is built, whether discernible or not. The present series is intended to occupy a midway position. The information, the problems, and the exercises will be of a directly useful character, and at the same time will be wedded to that proper amount of scientific explanation which alone will satisfy the enquiring mind. The series will therefore appeal to all technical people throughout the land, whether students or those in actual practice.



AUTHOR'S PREFACE

IN offering this little book, the author feels that he ought to explain why he, a Quantity Surveyor, has ventured to write on a subject which is, strictly speaking, the province of an Architect. Plainly stated, his reason is that "lookers-on see most of the game." After all, it is the Quantity Surveyor and the Builder who use the specification which the Architect has written; so surely they are as capable as anyone of pointing out what are its most essential points?

When the author was first approached by the publishers he hesitated in taking on the work, but on consulting several Architects, he found that they rather took the view expressed above and strongly advised him to proceed; therefore, he has done his best, and hopes that as a small handbook it will prove useful to beginners. The methods recommended are all culled from experience and have been gleaned largely from actual specifications, with the idea of taking the best points of many systems and fusing them into one workable whole.

The author feels that he cannot close this preface without expressing his thanks to the many kind professional friends who have encouraged him in his task, and to his staff (particularly Mr. John Hare, who has given so much help with the examples) for their constant interest and help in the search for information.

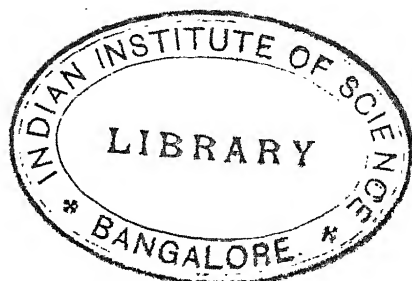
R. W. J. DAVIS.

LONDON,

October, 1926.

PUBLISHERS' NOTE

It is with very deep regret that we have to issue this work posthumously. Mr. Davis was taken seriously ill almost immediately upon its completion, and within a few weeks had passed away. Our grateful thanks are due to Mr. John Hare for his kindness in reading through the whole of the proofs.



CONTENTS

PART I. SPECIFICATION WRITING

CHAPTER I.

	PAGE
PRELIMINARIES	3

General description of works—Entrance—General conditions—Drawings, etc.—Materials and workmanship—Implements, carriage, etc.—Notices and fees—Deposit priced bill of quantities—Setting out—Scaffolding, etc.—Foreman—Facilities to others—Water—Damage to works, etc.—Rubbish, etc.—Clean glass, etc.—Completion of works—Maintenance—Prime cost sums—Objects of interest—Responsibility—Class of work—Contingencies.

CHAPTER II.

WORKS ON SITE	6
-------------------------	---

CHAPTER III.

EXCAVATOR, CONCRETOR, AND DRAINLAYER	8
--	---

Excavating—Brick rubbish—Concrete—Drain-pipe runs—Gullies—Fresh air inlet, etc.—Connections to sewer—Manholes—Cesspools, septic tanks, etc.—Intercepting traps.

CHAPTER IV.

BRICKLAYER AND PAVIOR	II
---------------------------------	----

Materials—Brickwork—Damp-proof courses—Rough axed arches—Fair face brickwork—Facings—Air bricks, etc.—Fixing and bedding and pointing frames—Fireplaces, etc.—Generally—Slab partitions—Pavings—Asphalte paving and flats—Terra-cotta.

CHAPTER V.

	PAGE
WALLER AND MASON	16
Stipulations—Walling—Facing—Arches—Generally—Stone dressings—Sills, steps, and copings—Staircases—Chimney pieces and hearths—Carving—Corbels, cover stones, and templates—Paving—Slate shelves—Spur stones—Preservative—Cramps, joggles, dowels, etc.	

CHAPTER VI.

SLATER, TILER, AND THATCHER	21
(a) <i>Slater</i> . Roofs—Ridges and hips—Finials—Valleys—Stone slates—Vertical slating.	
(b) <i>Tiler</i> . Roofs—Ridges—Hips—Finials—Valleys—Vertical or weather tiling.	
(c) Asbestos roofs and roofings of kindred materials.	
(d) <i>Shingler</i> . Shingled roof—Ridges, hips, etc.	
(e) <i>Thatcher</i> . Roofs—Ridges—Hips—Eaves and verges—Valleys.	

CHAPTER VII.

CARPENTER, JOINER, AND IRONMONGER	27
Materials—Centres, etc.—Plates—Lintols—Bressummers—Ground joists and sleepers—Floor joists—Roofs—Roof trusses—Joists to flats—Framed partitions and ashlaring—Roof coverings—Boarding for flats and dormer tops—Boarding to dormer cheeks, etc.—Gutter, valley and lie boards, and gutter sides—Tilting fillets—Eaves fascias—Fixing fillets, etc.—Barge boards—Half-timber work—Floors—Skirtings—Chair rails, picture rails, cornices, etc.—Wall and ceiling boarding—Panelled framings—Doors—Windows—Lantern lights—Window backs—Folding and sliding shutters—Cupboard fronts—Shelving—Dressers—Staircases—Ironmongery.	

CHAPTER VIII.

FOUNDER AND SMITH	38
Materials—CAST IRON: Rain-water pipes; Eaves gutters; Railings; Gratings, ventilators, stoves, etc.—WROUGHT IRON: Chimney bars; Gratings, railings, and gates; Plate corbels; Bolts, straps, etc.; Iron Staircases; Iron case-ments and windows; Corrugated galvanised iron roofing—STEEL: Rolled joists; Riveted girders; Roof trusses and stanchions.	

CONTENTS

xi

CHAPTER IX.

PLASTERER	PAGE 42
Materials—Walls and partitions—Ceilings and beam casings—External angles—Cornices, ceiling ribs, etc.—Enrichments—Generally—Keene's cement—Portland cement—Tile wall lining—External: Plain face rendering, cornices, etc.—Stucco—Rough cast.	

CHAPTER X.

PLUMBER	46
Materials—Flats—Gutters, flashings, dormers, etc.—Soakers—Rising main—Ball valve—Cistern—Safe to cistern—Branches off main—Services—Stop cocks—Bib valves—Sanitary fittings—Wastes and overflows—Flushing pipes—Soil and vent pipes—Connections of ground floor W.C.'s and vent pipes to drain—Wrapping pipes—Draining boards—Holes for pipes, etc.—Heating and hot-water installations—Testing.	

CHAPTER XI.

GLAZIER	51
Glass generally—Lead lights—Sundries.	

CHAPTER XII.

PAINTER AND PAPER-HANGER	53
Materials—Distempering—Painting on Plaster, Ironwork, Woodwork, and Old Work—Lettering—Paper-hanging.	

PART II. EXAMPLES

CHAPTER XIII.

PRELIMINARIES	59
The site—The entrance—General conditions—Drawings, etc.—Materials and workmanship—Implements, carriage, etc.—Notices and fees—Deposit priced bill of quantities—Setting out—Scaffolding—Latrines—Offices—Foreman—Water—Protection of work—Damage to works, fire, etc.—Rubbish—Attendance—Clean glass, etc.—Completion of works—Maintenance—Prime cost sums—Objects of interest—Responsibility—Class of work—Contingencies.	

CHAPTER XIV.

	PAGE
EXCAVATOR, CONCRETOR, AND DRAINLAYER	62
Materials—Excavating—Brick rubbish—Cement concrete—Concrete foundations—Surface concrete, and concrete floors, flats, etc.—Concrete lintels—Concrete staircase—Drain pipes—Gullies—Fresh air inlet—Connections to sewers—Manholes—Intercepting trap—Holes for pipes.	

CHAPTER XV.

BRICKLAYER AND PAVIOR	66
Materials—Brickwork—Rough axed arches—Damp-proof courses—Fair face brickwork—Facings—Air bricks, etc.—Fixing and bedding and pointing frames—Fireplaces, etc.—Generally—Slab partitions—Pavings—Steps.	

CHAPTER XVI.

WALLER AND MASON	70
Generally—Kentish Rag stone—Walling—Monk's Park Bath stone—Stone dressings—Joints—Carving—Sundries—Preservative—Hard Yorkshire stone—Cover stones—Templates—Steps—Sills—Coal shoot stone—Slate shelving.	

CHAPTER XVII.

TILER	72
Roofs.	

CHAPTER XVIII.

CARPENTER, JOINER, AND IRONMONGER	73
Materials—Centering—Floor joists—Roofs—Roof trusses—Roof coverings—Partitions—Floors—Skirtings—Doors—Windows—Lantern—Dresser—Iron dowels and water bars—Staircases.	

CHAPTER XIX.

FOUNDER AND SMITH	79
Materials—CAST IRON: Rain-water pipes; Eaves gutters; Stoves, etc.—WROUGHT IRON: Chimney bars; Screw bolts and straps; Railing to stairs; Iron casements and frames—STEEL: Joists; Stanchions.	

CONTENTS

xiii

CHAPTER XX.

	PAGE
PLASTERER	81
Materials—Hacking old walls—Lathing—Walls—Ceilings— Making good—Keene's cement—Portland cement—Wall tiling—External plastering.	

CHAPTER XXI.

PLUMBER	83
Lead—Flat—Flashings, etc.—Gutters—Soakers—Dormers —Regulations—Pipes—Brasswork—Connect to main— Rising main—Ball valve—Cistern—Safe under cistern— Cistern casing—Drinking water supply—Services—Con- nections to cistern—Stop cocks—Sink—Lavatory basins— Bath—W.C.'s—Overflows, traps, and waste pipes—Iron down pipes—Flushing pipes—Iron soil pipes—Wrapping pipes—Draining board—Holes for pipes—Testing.	

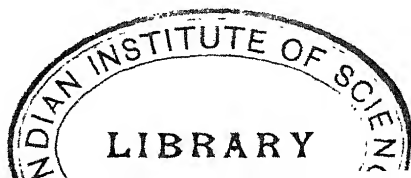
CHAPTER XXII.

GLAZIER	87
Materials—21-oz. sheet glass—26-oz. sheet glass—Flemish glass—Plate glass—Patent glazing bars and glass—Lead lights.	

CHAPTER XXIII.

PAINTER	88
Materials—Distempering—Painting on ironwork—Painting, etc., on woodwork.	

INDEX	89
-----------------	----





PART I.
SPECIFICATION WRITING.



CHAPTER I.

PRELIMINARIES.

OPINIONS differ enormously on the subject of this chapter. Some architects favour very long and elaborate preliminaries, and some reduce them to an absolute minimum—though what is the absolute minimum permissible is again a matter of opinion. The tendency of late years is towards reducing them as far as possible and making reference to the conditions of contract on the form of contract itself—usually one of those issued by the Royal Institute of British Architects. The ideal at which to aim is, of course, not to leave out anything which is necessary and not to include anything unnecessary; *i.e.* to make it quite clear to the contractor how far his responsibilities go and exactly what is required of him, so that the architect will have no unforeseen claims to contend with at the settling up; and can insist on the works being carried out according to his intentions.

Provided that it is clear and does not admit of any ambiguity, the actual wording or phraseology of the various clauses is a matter of choice; though some forms, it must be admitted, have a more professional air than others, even though the literary merits of both may be equal. Among the examples at the end of the book will be found a specimen set of "Preliminaries" clauses—clauses which have stood the test of trial; but as has been pointed out before, opinions differ profoundly on this subject, and no claim on their behalf for perfection is made; it is merely maintained that they are practical. In the following notes the writer attempts only to point out what are, in his opinion, the essentials of a set of clauses for "Preliminaries." Neither the notes, nor the examples, nor the order of the clauses need be followed absolutely literally to obtain a good workable set, but if the student acquires fully an appreciation of the principles underlying them, he should be competent to devise his own clauses in any emergency.

4 SPECIFICATIONS AND SPECIFICATION WRITING

General Description of Works.—Describe the geographical position of the works and, particularly in the case of alterations and additions, give a brief résumé of the work to be carried out.

Entrance.—In the case of a site with more than one access, the one to be used by the men and for materials should be pointed out.

General Conditions.—State that the works are to comply with the general conditions (if they are those issued by the R.I.B.A. say so), drawings, and specification.

Drawings, etc.—If it is desired that all drawings, details, etc., should remain the property of the architect, say so.

Materials and Workmanship.—State that these are to be of the best, that samples of materials are to be supplied to the architect on request, and anything else one may choose to put in to safeguard the general excellence of the work.

Implements, Carriage, etc.—State what the various descriptions in the specification are to be taken to cover, such as use of all tools, carriage to the works, fixing in position, etc.

Notices and Fees.—State what permissions are to be obtained from and fees paid to local authorities, etc., by the contractor on account of the works, and what have been dealt with by the architect (if any).

Deposit Priced Bill of Quantities.—This will apply only in cases where the price is based on quantities, and is intended to ease matters in arranging prices for variations in the final settling up; and the fact that it is required for this purpose should be stated.

Setting Out.—Make it quite clear that the contractor is responsible for the accuracy of the setting out of the works on the site.

Scaffolding, etc.—Describe the various things such as scaffolding, office accommodation for foreman and clerk of works, sheds for workmen and materials, latrines for workmen, etc., which the contractor is expected to provide; and mention also protection of walls during frost and similar matters.

Foreman.—Lay down that a foreman is to be kept on the works constantly. It is as well to include in this clause for his removal and replacement at the architect's request.

Facilities to Others.—Explain what the contractor's position is with regard to sub-contractors and others employed on the works, such as allowing them use of his scaffolding, etc., and his responsibility for damage to their goods.

Water.—State if the contractor is to be responsible for the provision of water for use during and for the execution of the works, or if he may use any available supply.

Damage to Works, Fire, etc.—Outline the contractor's responsibilities for all damage, fire, third party risks, etc. This is a most important clause, since a faulty clause may land the client for enormous expense.

Rubbish, etc.—The works should be kept clear at all times of useless materials, etc. Although this may be thought to be a matter of interior economy for the builder, it is as well to mention it in order to strengthen the architect's hands.

Clean Glass, etc.—Mention here all such things as cleaning glass and blacking stoves, scrubbing floors, etc., and generally ensure that the building is handed over at the end in a condition fit for immediate occupation.

Completion of Works.—In this clause is stated the time during which the contract is to be completed. It should be noted that it is absolutely useless to state a penalty for non-completion to time, as the chances of its being enforced in a Court of Law are practically nil. The amount to be paid should be called "ascertained and liquidated damages;" but even here, to obtain them it is necessary to prove that the delay has caused pecuniary loss.

Maintenance.—State how long the contractor is to maintain the works after the acknowledged completion. The reason for this clause will be obvious.

Prime Cost Sums.—It should be stated in this clause that "prime cost," "provisional," and "p.c." amounts are the nett cost to the contractor after deducting all discounts (except $2\frac{1}{2}$ per cent. cash discount), and do not cover package, carriage, cartage, return of empties, etc., the cost of which are to be added by the contractor.

Objects of Interest.—This clause should state what is to be done with any articles found on the site, and that they are to become the property of the employer.

Responsibility.—It should be stated in this clause that the entire responsibility as regards the method of carrying out, etc., is to rest with the contractor.

Class of Work.—The contractor should be referred to the drawings and to the site, as to the class of work.

Contingencies.—The amount to be provided for contingencies should be stated.

CHAPTER II.

WORKS ON SITE.

By the above heading is usually understood those items which belong to no particular trade, in the accepted sense of the word, neither could a true impression of them be given in a bill of quantities by the ordinary system of measurements. They may occur either in the preparation of a site for a new building, where, for instance, old buildings have to be removed ; or in works to an existing building, such as pulling down or cutting openings in old walls. It is, therefore, even more necessary in this part of the specification than in any other part that one's composition, in a literary sense, should be clear and concise, since the work here described is not the ordinary cut and dried builder's work, and a faulty description may cause much damage and lead to endless controversy. Reference may, and frequently should, be made to the drawings ; and great care should be taken to see that the specification and the drawings do not contradict one another.

It happens frequently that works of this kind have to be carried out while a building is in occupation, a fact which probably necessitates their being done piecemeal. If it cannot be decided at the time when the specification is being written in what order the parts of the building affected can be handed over to the contractor, a clause such as " the following works to be carried out in such order and at such times as will suit the convenience of the employer," will often save much heartburn and bad feeling.

It is impossible to lay down any hard and fast rules as to what should be included in the various clauses themselves—as has been said before, the whole matter is one of clear and full description of the work to be done. Neither is it possible to say in what order the items should be taken, since no two jobs are alike. One great point to bear in mind, however, is that anyone should be able to walk round the place affected,

with the specification in his hand, and be able to pick out on the site, without difficulty, all the items mentioned therein. It is, therefore, a good plan for the writer to endeavour to imagine himself in the place of the above-mentioned man and describe the items as he would find them. For a building of sundry floors, take it floor by floor—it will be found, usually, most convenient to start at the top—and follow round each floor room by room, following the same system, as far as it will apply, on each floor. Items such as the insertion of a new lift through old floors are sometimes best dealt with on their own, and not floor by floor, since the work to each floor is probably the same as that to the others, and there is no need to repeat it. Another point to remember is that internal work should be kept separate from external work—again on the plea of ease in picking out the items while visiting the site.

Finally, if possible, get some one who knows but little about the particular job which is being specified to read this part of the specification through, referring to the drawings the while, to see if the impression conveyed is that which was intended. The writer knows what he means, and may be able, quite honestly, to read the required meaning into what he has written; but the meaning conveyed to some one else may, unfortunately, appear quite differently.

CHAPTER III.

EXCAVATOR, CONCRETOR, AND DRAINLAYER.

FOR these trades elaborate descriptions are not necessary, since the drawings should give the bulk of the information required ; and it is unnecessary to duplicate it. Descriptions, therefore, should be restricted mainly to materials and methods, as set forth in the following notes.

Excavating.—Describe the levelling of the site and refer to the drawings regarding the dimensions of trenches, pier holes, basements, etc. Describe also the disposal of any surplus soil, *i.e.* whether the remainder, after a proportion of the excavated soil has been filled in around foundations, is to be carted to shoot or wheeled and deposited on the site ; if the latter, the position in which it is to be deposited should be stated. It is as well to state that all obstacles met with in the course of excavation are to be removed. Call attention to the facts that the contractor must judge for himself as to the nature of the soil, that he must keep all excavations free from water, that he must at once remove any slips of earth, and that he must execute any planking and strutting required.

Brick Rubbish.—If hard, dry, broken brick rubbish is to be put under pavings, etc., the finished thickness, after well ramming, should be stated ; and if it is to be filled in around basement walls as a dry drain, state the thickness from the face of the wall, the fact that it is to be filled in in layers, the depth of each layer, and also that each layer is to be rammed.

Concrete.—Describe fully the component parts and proportions of such for each type of concrete used (if there are more than one), stating the purpose for which each kind is to be used, and the methods of mixing and putting in position (*i.e.* whether to be tipped or placed carefully). Call attention to the facts that it is not to be disturbed while setting, and that the ground, in the case of concrete in foundations, etc., is to

be well rammed to receive it, to ensure a good bed. Refer to the drawings for dimensions of foundations, but state the thicknesses of surface concrete and concrete floors and flats, and also if the surfaces are to be finished to falls: the positions of the last two should also be stated, and also if they are filled in between and around steel joists, expanded metal, etc., which may be described with the floors, although the materials really belong to the trade of "Founder and Smith." Concrete lintels should be described in detail, both as to sizes and positions, together with the reinforcement (if any) and the bearing to be allowed at each end. Concrete steps and staircases should be described in detail, giving position, sizes, shape, and finish. If square wall ends are required on spandril-shaped steps, this should be stated.

Drain-pipe Runs.—Describe fully the type or types of drain pipes to be used, their sizes and the positions of the runs, together with the falls to which the pipes are to be laid and the method of jointing. With regard to bends, junctions, taper pipes, etc., it is enough to state that these are to be provided where necessary. State how the surplus soil is to be disposed of (see "Excavating"), call attention to the necessity for planking and strutting, and if the pipes are to be bedded on, or surrounded with concrete, say so, stating the minimum thickness of the concrete.

Gullies.—Describe these in detail, mentioning their positions, and state how they are to be set. Describe also the curbs around same, if any, or in the case of yard gullies, if the paving is to be dished; and for those taking lavatory, etc., wastes, describe also the lengths of channel to be bedded at the side of the gullies.

Fresh Air Inlet, etc.—Describe the valve and length of pipe for this purpose, also where and how fixed and how connected to the drains. The connections of vent pipes, soil pipes, ground floor W.C. pans, etc., to the drains are items which can be described in either the "Drainlayer" or the "Plumber," as the plumber actually makes the connection to the socket which the drainlayer has put in position, and the latter puts in the concrete belt.

Connections to Sewer.—These may be described, stating whether there is a separate connection or not for rain-water or soil; that all watching and lighting are to be provided; that all risks are to be taken, and that the road and path are to be

made good to the satisfaction of the architect and the authorities. Alternatively a p.c. sum should be given for this work.

Manholes.—For the dimensions of manholes, reference may be made to the drainage plans. The parts of the manholes, that is, the walls and internal finish of same, bottoms and channels, tops (*i.e.* whether oversailed or formed with slabs) and covers should be described in detail together with the setting of the last ; and if the covers are to be bedded in their frames in grease, or any other material, it should be stated.

Cesspools, Septic Tanks, etc.—The note above for manholes applies also to these and all similar items.

Intercepting Traps.—Describe these, giving sizes, and state to which manholes they are to be built in.

CHAPTER IV, BRICKLAYER AND PAVIOR.

THE remarks at the beginning of Chapter II. also apply, in a large degree, to this chapter. The drawings will show the dimensions of practically all the items which can be described under the heading of "Bricklayer," but the descriptions of materials should be ample, and anything which cannot be shown on drawings should be fully and clearly laid down. There is a greater temptation in this trade than in almost any other to describe items ambiguously; but experience shows that this practice, while saving time and trouble, perhaps, at the beginning of a job, only causes unnecessary worry at the end.

Materials.—First of all describe the component parts of the mortar, and then the proportions in which they are to be mixed. With regard to the sand, call attention to the facts that it is to be sharp and clean and free from impurities, such as salt or loam; in the case of seaside works it is as well to mention that no sea-sand will be allowed on the site. If lime mortar is to be used, describe the kind of lime; in the case of cement mortar, reference can be made to the cement described for concrete. It is as well to state that the use of mortar which has once begun to set will not be allowed. Lastly, describe the bricks, *i.e.* those used in the bulk brickwork: those for facings (if any) will be described under the heading of "Facings."

Brickwork.—Under this heading can be mentioned the bond in which the brickwork is to be built, and any particular points of construction, such as: flushing up the brickwork at each course; carrying up the building all round at the same level; "the height of four courses of brickwork is not to exceed the height of four bricks laid dry by more than one inch;" "no bats are to be used except where required for bond," etc.—in fact, anything which will ensure the work being properly executed. In the case of hollow walls, describe the width of

the cavity and also the ties and at what spaces they are to be built in ; mention weeping holes, the keeping clear of the cavity and ties from mortar (this last is most important), and the leaving of sand courses at the bottom of the cavity for cleaning out same. Describe also how the cavity is to be stopped against openings.

Damp-Proof Courses.—Describe fully the type or types of damp-proof course to be used. There is no need to state the widths of the horizontal courses, as these will be governed by the thicknesses of the various walls. In the case of vertical damp-proof course, it should be made quite clear if this is to be applied to the outside of the wall or filled into a cavity (this last really applies to asphalte only) ; and the raking out of the joints in the brickwork to form a key should be mentioned, together with the pointing of the top edge. For slate damp-proof courses it is not necessary to mention the thickness, though it should be laid down that the two courses of slates are to be bedded in cement, breaking joint : on the other hand, it is necessary to state the thickness of asphalte damp-proof courses, and also if they are to be laid or applied in two thicknesses. One type of horizontal damp-proof course has not yet been mentioned, *viz.* that between two layers of concrete in a basement floor where water pressure is anticipated ; but if the foregoing points are borne in mind, the above description is only a matter of common sense.

Rough Axed Arches.—These can, if desired, be described with the general brickwork, but it is often advisable to call particular attention to them by describing them on their own. For relieving arches and arches over openings, describe if they are to be for the full thicknesses of the walls in which they occur and also the number of rings in which they are to be turned : for trimmer arches it is sufficient to state under what hearths they are to be built.

Fair Face Brickwork.—State which walls are to be finished fair and describe the pointing. Arches in fair face brickwork should be described here. If fair face walls are to be lime-whited or distempered this may be described here or in the " Painter," whichever is preferred.

Facings.—If the building for which the specification is being written is to be faced externally with bricks, both the bricks themselves and the pointing should be described : the bond mentioned under the heading of " Brickwork " applies to

this clause also, and need not be further described. Whether the name of the maker of the bricks and/or a p.c. price per thousand are mentioned is a matter entirely for the discretion of the architect. If different elevations of the building are to be faced with different kinds of bricks—the walls of a light well may be faced with white glazed bricks, for example—these elevations and the various bricks used should be clearly stated.

Arches in facing bricks are usually fair axed, and should be described as noted above for rough axed arches, together with their positions. Those in moulded bricks should be described as being "to detail" unless of a stock pattern, when reference can be made to the maker's catalogue: in the case of arches in glazed bricks it should be stated that the bricks are not to be cut, but are to be shaped.

The note on moulded arches applies to all moulded brickwork, and, indeed, to all brickwork where the bricks are to be of a special character as regards shape. Rubbed and gauged work should be described fully—the bricks themselves, whether they are to be set in lime, putty, or shellac, and the positions of the work being the most important points to be remembered. In fact, one might mention dozens of hypothetical points, in the various treatments of brick facings, which should be described if they appear in the design—rusticated brickwork, quoins, aprons, brick sills, copings, caps to chimney stacks, and so on—but if the object of a specification has once been grasped the description of all these items resolves itself purely into a matter of writing clear and concise English, and no hard and fast rules can be laid down.

Air Bricks, etc.—Describe the air bricks and where they are to be built in, the formation of openings behind same (and if these are to be rendered in cement), and also ventilators (if any) which are to be fixed at the inner ends of the openings.

Fixing and Bedding and Pointing Frames.—Describe the bedding and pointing of door and window frames; and if breeze blocks or hoop-iron cramps are to be built in around openings, describe these also.

Fireplaces, etc.—Fireplace interiors, stoves, kitchen ranges, etc., are usually described in the "Founder and Smith," but the setting, etc., should be described here, mentioning that the contractor is to supply all necessary firebricks, fireclay, etc. If fireplaces are to be constructed entirely of brickwork,

reference should be made to the detail drawings, unless of a very simple nature, when they can be described, giving full particulars. Describe also the flues, and if these are to be parged and cored or lined with flue pipes, and mention the building in of soot doors, chimney bars, etc.

Generally.—Mention raking out and pointing to lead flashings, cutting grooves for iron tongues, building in ends of joists, etc., beam filling, cutting, toothing and bonding new work to old; and, indeed, anything necessary to ensure good work. Provided that it does not become too involved, it is always better for a specification to be over-full of detail than to be too bald.

Slab Partitions.—Some architects prefer to describe these in "Plasterer," but as they are nowadays usually erected by bricklayers, the practice of describing them in this trade is becoming more general. The thickness, composition (in the case of a proprietary article, mention the name of the maker), bedding and jointing, and method of connecting to brick walls are sufficient points to describe concerning the partitions themselves. The positions can be described in detail, but it is simpler to mention the colour in which they appear on the drawings, and this method is quite as effective as the other.

Pavings.—Cement, granolithic, tile, brick, etc., pavings should all be described in detail. The thickness of plastic pavings and of screeds for tile pavings should be stated, but for brick pavings it is sufficient to state if these are laid flat or on edge (generally the latter) and whether or no they are to be bedded and pointed in cement; this last point applies to tile pavings also. The positions can be defined by the colours on the drawings, as described above for "Slab Partitions." All steps constructed or faced with any of the above materials should be described in detail, and their sizes and positions clearly defined; and oddments such as wrought-iron cramps to the fair ends of brick steps should be mentioned. Finally, call attention to matters such as keeping plastic pavings covered with wet sawdust to prevent too rapid drying and consequent cracking and keeping surfaces of tile pavings clear of cement—in fact, leave nothing to chance.

Asphalte Pavings and Flats.—It is usual, for this type of work, to specify by name some firm of repute, particularly where flats are concerned, as nothing lets down the reputation of an architect more than a leaky roof; and unless the as-

phalte is of really first-rate quality, the chances of its cracking are far from remote. Whether p.c. prices are mentioned for the various items is a matter for the architect's personal decision, and arguments, into which it is not proposed to enter here, can be advanced both for and against the idea. Anyhow, when specifying these items, describe them fully ; for instance, give the thickness, state if the asphalte is to be laid in one or two thicknesses and if the surface is to be finished to falls, and mention all such points as dressing around railing standards, lining gutters, dishings to outlets, etc. Asphalte skirtings can be included in this clause, the important parts to note being the thickness, height, the fillet at the bottom and the finish of the top edge.

Terra-cotta.—This being, as a rule, a proprietary article, and the work of specialists, it is generally included for in the specification by means of a provisional amount or p.c. sum. Having chosen the particular brand of terra-cotta which, all things being considered, will best suit the case in point, the main points which the architect has to bear in mind, as far as his relations with the manufacturer are concerned, are such as the following : Is the price for material fixed complete ; delivered to the site only ; delivered in truck to nearest station only, or for goods at works ? Does the manufacturer guarantee to conform in all respects with drawings, instructions and all models approved, and admit the right of the architect to reject any work which, in his opinion, is unsatisfactory, such rejected work to be replaced at the manufacturer's expense ? Other points will suggest themselves when occasion arises : but it is worth while bearing in mind that it generally eases matters considerably for the architect if he can arrange for the manufacturer to fix ; since, for one thing, it is rather the work of a specialist, and for another, most of the responsibility for satisfactory work is placed on one firm rather than on two. A certain amount of responsibility will, however, have to be left on the general contractor, who is almost sure to have to do a good deal of handling, and also to supply the concrete filling, no matter who fixes. Therefore, the part to be played by the general contractor should be very clearly laid down, and the composition of the concrete filling very carefully specified. The great thing in the last, which has to be guarded against, is expansion, since if this occurs after the terra-cotta is filled, the terra-cotta will burst and the whole work be spoiled.

CHAPTER V.

WALLER AND MASON.

CONTRARY to the practice in most trades, it is seldom advisable to commence this trade with descriptions of the kind or kinds of materials to be used. For different purposes various kinds of stone will probably be used ; and it is more helpful, as a rule, to describe these various purposes under headings of the varieties of stone. Certain stipulations, however, will apply to the whole of this trade, and can all be dealt with in one paragraph at the beginning. The most usual of these stipulations are mentioned in the following paragraph under that heading.

Stipulations.—Lay down that all stone used on the works, of whatever variety, is to be the best of its kind, and to be free from all flaws, vents, sandholes, cracks and other defects. Following this (and to ensure good work, these are equally important as the last) specify that no stone is to be hollow bedded and all is to be set on its natural bed. Having ensured the quality of the stone and its setting, mention that all stonework is to be preserved from injury of any kind, and that any stones that may be damaged, even after setting, will have to be replaced. In this clause, also, such items as the following can be described or stated : the mortar in which the stone is to be set ; the facts that all worked stone is to be in accordance with detail drawings, and (if desired) that specimens of tooling, etc., are to be executed for the architect's approval ; the method of jointing required to be carried out (joggles, dowels, etc.), and the provision of moulds, templates, setting-boards, etc., by the contractor.

The above stipulations apply practically all through this trade. There may be others peculiar to individual items, and for the sake of emphasis, if for no other reason, it is as well to mention these with the respective items.

As stated at the beginning of this trade, it is often advisable

to group the various features to be executed in stone under primary headings formed by the varieties of stone, therefore no hard and fast rule can be laid down as to arranging the following items. The varieties of stone are legion, and those chosen depend not only on the purposes for which they are to be used, but also, to a very large extent, on the districts in which the works are to be erected, as local atmospheric conditions play an enormous part in the durability of stone. It may be as well, however, to mention here a few points to be borne in mind when describing in a specification, some of the best-known stones, particularly those great favourites, Bath and Portland: these points can be adapted as required for other stones.

In the case of Bath stone, be very definite about the variety (*i.e.* Monk's Park, Box Ground, or any other selected for the particular purpose), as their wearing qualities differ enormously. Some architects like to specify the quarry owners also, and there is much to be said for this, since a firm with a reputation to uphold will generally take the trouble to ensure that sound material is supplied. This remark applies also, of course, to other stones beside Bath. For Portland stone, state the bed—generally the Whitbed (or second layer down), as this stands the sulphurous atmosphere of a city best of all. It is generally sufficient to describe York stone as “hard,” since it is largely used for steps, pavings, and templates, in which positions hardness is the first consideration: while as for granites and marbles, the place of origin and colour can generally be relied upon to denote the type required.

Walling.—Reference can be made to the drawings for the thicknesses and heights of walls, as described in “Bricklayer.” Describe, however, if the stones are to be in random shapes or squared, and if they are to be built in random courses, brought up to level courses at fixed heights, or if each course is to be level. If extra large stones are required for footings, it should be mentioned. State the treatment of the face and the pointing and whether on one or both sides, and at what intervals through stones are to be built in. The sizes of quoin stones should be given.

Any particular features, such as rusticated quoins or plinths, can be described in detail, mentioning the width of the drafted angles, the sizes of the stones, etc., but as large size detail drawings are almost invariably supplied for all such items, a

mere mention of these and similar items in the specification (to ensure their not being overlooked) is usually sufficient, and the contractor can be referred to the detail drawings.

Facing.—Where brick walls are to be faced with stone, describe all the points mentioned above for “Walling,” and in addition state the average bed.

Arches.—Arches to match the walling or facing are often built in over the dressed stone arches; or as relieving arches over stone lintels. If these are intended, the depth of the voussoirs, and the height of the arch on the face should be stated.

Generally.—Mention the execution of all such items as beam filling, building in ends of timbers, etc., cutting grooves for lead flashings, fixing door and window frames, setting chimney pots, etc.—in fact, all the odd items which would be mentioned were the building to be erected in brickwork instead of stone.

Stone Dressings.—Experience has proved that to attempt to describe these in detail is sheer waste of time. No description, however full and concise, can convey to the mind of the mason exactly what is in the mind of the architect, who should, therefore, prepare full detail drawings of all this kind of work. If all the dressings are to be executed in one kind of stone, the specification should state what this is, and then refer to the drawings. If different dressings are to be in different kinds of stone, the detail drawings should either be clearly marked with, say, P.S. for Portland Stone and B.S. for Bath Stone, or should be coloured with different tints for the different stones, and these facts should be stated in the specification. It matters not what system is adopted, so long as the intention is made perfectly clear.

In previous paragraphs provision has been made to ensure, as far as is humanly possible, that the stone for the above is of good quality, is properly set, and is worked correctly. It now remains only to state by whom it is worked and set, if it is thought advisable not to leave this to the discretion of the general contractor. Few contractors, in these days, work stone themselves; and this being so, many architects prefer to trust their details to firms whom they know from experience to be used to their particular types of work—perhaps rather on the principle of “better the devil you know than the devil you don’t know”—than to firms of whom they know nothing.

Frequently the choice is for a local mason, to whose yard the architect can go and inspect the work in progress. Another contention is that it is better to have the stone worked at the quarry, when this is possible, since the quantity of stone at hand allows of choice being made of individual stones to suit particular purposes ; whereas the mason who buys stone in blocks is, naturally, going to use every scrap if possible, and is, moreover, confined to what is sent him from the quarry. A further argument in favour of having stone worked at the quarry is the saving of freightage on the waste. So much for the working. The case of setting is somewhat different. If the quantity of stone to be set is small, it will not pay, as a rule, to do otherwise than allow the contractor to make his own arrangements for setting, even though a particular firm may have been specified to work it ; but if the quantity is large, it will generally be found advisable to insist that the firm which works the stone is to set it also, as the responsibility is narrowed down to one firm. These remarks are, of course, expressions of opinion only, and each architect has his own idea on the subject ; but the point to be borne in mind is that if the contractor is not to be left a free hand as to who is to work and set the stone, this fact should be made quite clear in the specification.

Sills, Steps (or Thresholds), and Copings.—Specify widths and depths, all labours and positions in which they are to be built. In the case of the first two, state if in scantling lengths or not, and what length is to be built in each end. If the last are to be jointed with cramps, describe these, and whether run with lead or any other material.

Staircases.—Describe whether steps are solid, spandril, or built-up treads and risers, give particulars of nosings (if any), amount pinned into walls, and general finish. Describe any particular feature, such as a rounded corner to a bottom step, and mention any mortices and leading in of newels, railings, etc.

Chimney Pieces and Hearths.—These, if very simple, such as those for kitchen fireplaces, can be described in full, giving the thicknesses of the slabs, together with treatment of surfaces and exposed ends and the method of setting or fixing. Anything of a more ambitious nature should be the subject of a provisional sum, or reference may be made to the drawings.

Carving.—This should be the subject of a provisional sum.

Corbels (for Ends of Timbers next Flues), Cover Stones, and

Templates.—For the first, the mention of “small rough stone corbels for ends of timbers next flues” should be sufficient. For the second, state the finish and the thickness, and that they are to be of the full width of the walls which they are to carry. For the last, describe these in detail, *i.e.* give sizes, positions, and finish.

Paving.—Describe the thickness, the sizes or average sizes (as the case may be) of the stones and the setting, and mention if the paving is to be laid to falls or dished around gullies.

Slate Shelves.—State where these are to be put, and describe the thickness, whether the surfaces and edges are to be planed, and if the joints are to be made in oil cement and give details of the bearers.

Spur Stones.—Describe these and their setting in detail.

Preservative.—Specify the kind of preservative to be applied; and if it is to be applied by the manufacturers or by the contractor, in accordance with the manufacturer's directions.

Cramps, Joggles, Dowels, etc.—These should be described with the items for which they are required, stating sizes and how they are set.

CHAPTER VI.

SLATER, TILER, AND THATCHER.

(a) SLATER.

BEFORE proceeding with actual items of the slater's work, a few notes on slates in general may not be out of place, although it is not necessary to commence this trade with a list of materials.

Welsh slates are usually sold in sizes—duchess, countess, lady, etc.—and the whole of a roof laid with slates of one size. Westmorland slates, on the other hand, are not sold in sizes, as a rule, and roofs which are covered with these, generally have the slates laid in diminishing courses from the eaves to the ridge. Welsh slates are generally split much thinner than are Westmorland slates, and in consequence the latter are heavier than the former, and need stronger timbering to support them.

Cornish slates, to mention another good British slate, can be obtained both in stated sizes and random sizes, the latter for fixing in diminishing courses, although the quantity of output is not to be compared with those already dealt with, particularly the Welsh. Foreign slates are also used to a quite large extent, being imported from U.S.A. and Norway, to mention only two sources. Before specifying these last, however, particulars of the sizes in which they can be had should always be obtained.

In the past, slate was frequently used for ridge and hip rolls in conjunction with slate wings; but this method has proved itself so unsatisfactory that it is practically discarded, and is seldom used except in repairs or alterations to existing roofs where these are already instated. In short, slate as a material really lends itself only to the surface work of roofs, and all finishings are carried out better in other materials, such as lead or tile.

Roofs.—Specify the kind of slates to be used (and, if possible, the particular district or quarry from which they are to be obtained), and the colour : if the slates are to be all of one size (as stated above, this is usual in the case of Welsh slates), state the size and lap required ; if the slates are to be laid in diminishing courses, a statement of this fact is sufficient, and no sizes need be mentioned. Now state the kind of nails (composition, copper, etc.) to be used and the number to each slate (usually two), and to what they are to fix the slates, *i.e.* boarding or battening. The boarding or battening itself will be described in “Carpenter.” If the roof is to be torched on the underside, mention it here.

In this clause may be mentioned cutting and fitting slating to all top edges and to abutments ; closely cutting and mitring hips and valleys, including the use of extra large slates on each side ; the treatment of eaves and verges and whether these are to be pointed in cement ; and the fixing of lead soakers described in “Plumber.”

Ridges and Hips.—If these are to be covered with tiles, describe them and their setting and jointing. If with lead, or (in the case of the latter only) secret gutters are to be put, mention that they are described in “Plumber.”

Finials.—If these are to be in terra-cotta, the maker’s name and catalogue number or a p.c. price should be given, and the setting only described. Lead finials will be described in “Plumber.”

Valleys.—Occasionally valleys are swept, but this process is more often carried out in Westmorland than in Welsh slates. If this is intended, it should be described and the radius of the sweep given ; there will then, of course, be no “cutting and mitring.” Lead valleys—the most usual—will be described in “Plumber.”

Stone Slates.—The foregoing clauses from “Roofs” on, cover practically all the points to be noted in regard to roofing with stone slates—or slabs, since the term “stone slates” is really an anachronism. Like Westmorland slates, they are generally laid in courses diminishing from eaves to ridge, but for these a thickness should be stated—either a minimum or an average. Either oak pins or nails are used, but which are intended should be mentioned. And the stone ridges and hips should be described in detail, mentioning the kind of stone, the size, and the jointing.

Vertical Slating.—This is rather a thing of the past, as slate, being a natural product and cut from huge bulks, has no nibs which can be hung over battens; consequently, the whole weight of the slate is borne by the small portions above the nail holes, and these cannot always bear the strain and so break. The mitres at angles are unsatisfactory features, too, even though bedded in cement. However, the purpose of this book is to show what points should be mentioned in a specification, and not to give a dissertation on the properties of different materials; so, to proceed.

Vertical slating should be described as given for slating on roofs, particular mention being made of the finish of angles, and the bedding of angles and pointing of verges in cement.

(b) TILER.

Roofs.—Describe in detail the tiles to be used, *i.e.* whether sand faced or otherwise, hand-made or machine-made, the colour, etc., or give a p.c. sum per 1000, and mention the lap required. State if the tiles are to be nailed each course, every (say) fifth course, or hung without nails (in the former cases describe the nails), and mention to what they are to be fixed. The above notes apply to pantiles also, and these are usually bedded and pointed in mortar or cement.

There are now sundry tiles of continental types on the market, such as Marseilles tiles, and as these are self-locking, no lap is involved, and the description can be cut down to little more than the name. It is claimed that owing to their self-locking features, these tiles require no nailing, but this is a point rather for the architect to decide, as exposed positions, or very steep slopes, are always rather dangerous for un-nailed tiles.

In this clause the various cuttings, etc., as described in the "Roofs" clause of "Slater," may be mentioned, but "closely cut and mitred" hips and valleys are very rarely executed in tile-covered roofs.

Ridges.—Describe the tiles to be used, together with their setting and jointing. If exposed ends are to have any special finish, such as being tilted and filled with coloured cement or pieces of tile, mention it here.

Hips.—If these are to be covered with tiles to range with the courses of roofing tiles, describe them as such, and state

that tiles and a half are to be used on each side : furthermore, if each tile is to be tilted and bedded in cement, state this also. If superimposed hip tiles are to be used, describe them similarly to the ridge tiles as above. Hip hooks should be mentioned here, together with their fixing.

Finials.—The paragraph in “ Slater ” will apply here.

Valleys.—Swept valleys should be described as given in “ Slater.” Valleys formed with tiles to range with the courses of roofing tiles should be described as given for hips.

Note.—For both hips and valleys, tiles should be stated to be “ purpose made ” or “ purpose made if required ” if (1) the junction between two slopes is not a right angle ; or (2) the intersecting slopes are not of the same pitch.

Vertical or Weather Tiling.—Describe this as given for roof tiling, and mention, in addition, that all vertical angles are to be formed with angle tiles, “ purpose made ” if for irregular angles.

(c) ASBESTOS ROOFS AND ROOFINGS OF KINDRED MATERIALS.

Within the last few years these have become so general in use that they would seem to merit a sub-section to themselves. The great objection to the earlier examples was their supreme ugliness, which ruled out their use from all buildings in which the architect could afford to study appearance. Now, however, many firms are making roof coverings of asbestos and other tile-substitutes so like the genuine article in appearance, that this objection in great part disappears. The great advantage of all these, of course, is cheapness ; as, not only are the articles themselves cheaper than almost all tiles or slates, but they are so much lighter in weight that considerable savings can be effected in roof timbers.

For those varieties which aim at superseding slate or tile roofs, the clauses which have been given for “ Slater ” and “ Tiler ” will apply ; but if a p.c. price is not given, the description should be very full, particular note being made if the tiles are for diagonal fixing.

For corrugated or flat roofing sheets, in addition to the sizes and thicknesses of the sheets, it is as well to specify the maker's name. Mention also the screws (generally with cupped washers) which are to be used. There is, of course, no work to eaves to be mentioned, unless these are raking, but otherwise

the labours and accessories mentioned in "Slater" and "Tiler" generally apply.

(d) SHINGLER.

In this country, shingles are seldom used except in small quantities, *i.e.* for such purposes as to cover very small spires or the roofs of lych gates. They can be obtained in various woods, and need to be fixed on a fairly steep slope.

Shingled Roof.—Specify the wood of which the shingles are to be cut and the fact that they are to be split, not sawn. Give the size or sizes of shingles required, the thickness, the lap, the nails (copper or otherwise), and to what they are to be fixed, and notes as to double courses at eaves, etc., as described for tiles, etc.

Ridges, Hips, etc.—These are formed variously of boards, lead, zinc, etc. If of boards, describe them here; if of lead, etc., merely mention here—they can go in with the general descriptions of leadwork in "Plumber."

(e) THATCHER.

Thatch as a roof covering has been out of favour from the early years of the nineteenth century until quite recently; indeed, one might almost say that the trade of thatcher would have died out completely but for the necessity of making repairs to existing thatched roofs. And even this fact was of little avail in some districts, where thatch was often removed and some other material substituted. The last few years, however, have seen a revival of this form of roof covering for country cottages and houses, and this being so, a few notes on the subject may not be out of place.

Of the two kinds of thatching most in use, reed-thatching is the better and lasts much longer, while straw-thatching is good enough for temporary structures; heather-thatching is seldom used, except for buildings of a very light structure, such as summer-houses. To a certain extent, however, the choice of material depends on the district in which the work is to be executed (though to a less extent than formerly owing to increased facilities of transport), as reeds grow only in fen districts such as the Norfolk Broads. It is not proposed here to give a treatise on the work, and for full details of thatching and how it is carried out the student is referred elsewhere, but

the following are a few points which should be mentioned when thatching is to be specified.

Roofs.—State the material of which the thatch is to be constructed; describe it as being of the best quality and of as long lengths as can be conveniently used on the different parts of the roof; give its thickness and how it is secured to the battens or roof timbering and refer to the drawings for the general run of the roof. Include in this clause such items as damping straw before use (if desired), raking down thatch to remove loose or broken straws, etc., and “shaving,” any trimming up at the end and working around chimney stacks, etc. For any fancy patterns, refer to the drawings, merely calling attention to them here.

Ridges.—Describe fully how and of what these are to be formed, or describe the material and refer to the drawings.

Hips.—These are usually described merely as being “fair.”

Eaves and Verges.—Give the projections from the faces of the walls and describe the angles at which the thatch is to be cut off.

Valleys.—The important part about these is that there should be an extra thickness of material in them, as they will carry the greatest volumes of water of any parts of the roof.

Specifications of roofing work of no matter what description should always close with some such general clause as the following: “Leave all roofs sound and watertight at completion.”

CHAPTER VII.

CARPENTER, JOINER, AND IRONMONGER.

As it is not the object of this book either to teach building construction or to give instruction on the properties of building materials, it is not proposed to give here lengthy descriptions of the various kinds of timber which can be used on building works ; neither is it proposed to discuss the relative values of timber marks or markets. The architect should have mastered those points (or at least have good books of reference handy), and so know exactly what he wants and intends to have, before he commences his specification. The whole question of timber has, since the war, changed so much from what it was in pre-war days, that one has constantly to keep in touch, or one will find that all one's ideas are out of date. Old markets have disappeared and new ones have arisen ; timber marks have changed, and continue to change ; and woods, which in previous ages were either unknown or scarcely considered with relation to building works, have appeared on the markets.

It should be borne in mind that in the timber trade the word "best" alone has no real significance, as it is not a recognised trade term.

In the following clause will be found general notes which have been proved by experience sufficient to ensure good work ; and a reference to that in the examples at the end of the book will show how these notes may be incorporated.

Materials.—Commence with a general note such as "The whole of the timber (or materials) is to be sound and well seasoned, and entirely free from sapwood, large, loose, or decayed knots, waney edges, and all other defects."

Now state the countries or places of origin of the various woods required ; and if any particular qualities (particularly with regard to fir or deal) are desired, state these here.

If any or all timbers (this applies particularly to joiner's

work) are to hold the specified scantlings when fixed, this should be clearly laid down ; if this is not done, it is the practice to allow $1/16$ th in. off the given scantlings for each wrought face.

To safeguard further the quality of small scantlings, such as 4×2 ins., it is often advisable to state that, if required by the architect, these are to be cut out of larger timbers, such as 8×2 ins. or 9×2 ins. This ensures their being cut from larger trees and reduces the chances of sapwood.

Lay down that plates are to be in as long lengths as possible, properly scarfed at joints and tied at angles ; that trimmers and trimming joists or rafters are to be 1 in. thicker than common timbers ; that no timber is to be within 2 ins. of the face of any flue ; and any other general points in construction of carcase work that it may be desired to mention.

It is also advisable to state in this clause such items as the preparation of joinery as soon as possible after signing the contract ; and the stacking of same ready for glueing up, to allow for shrinkage and the keeping clean of joinery for staining (if any) ; and mention should be made of such facts, that all circular frames are to be put together with oak keys and wedges, that all joinery is to be to detail, and that mouldings are of a special character, and will require purpose made irons ; and also if any special hand finishing is required.

With regard to ironmongery, it is usually sufficient to state that it is to be obtained from an approved maker, and that the screws are to be of the same metal as the articles with which they are used.

Note.—No mention is made in the following notes of the kinds of timber to be used. Generally speaking, all carpenter's work is taken to be in fir unless otherwise specially described ; but for joiner's work the kind of timber should be mentioned in all cases, usually in the heading of the clause.

Centres, etc.—These need not be described in detail. It is sufficient to state that all centres, etc., for arches, centering and supports for concrete floors, and shuttering and supports for concrete walls are to be provided, fixed, and (except in the case of centres for trimmer arches, which should be described to be left in) afterwards struck. It is often as well to add, either that they are not to be struck without reference to the architect, or else give a minimum time from the placing in position of the concrete during which they are not to be struck.

If the centering is to be treated in any way to prevent adhesion to the concrete, it should be described.

Plates.—Give scantlings of these.

Lintols.—Wood lintols have largely given place to concrete. If, however, these are desired, give the scantlings, state how much they are to be longer than the widths of the openings, and intimate for what openings they are intended. Alternatively to giving the scantlings, lay down general principles such as, "of the widths required and 1 in. in depth for every foot of span, with a minimum depth of 3 ins."

Bressummers.—Describe the component parts and the numbers of such, including bolts. State the amount of bearing to be allowed each end, and intimate over what openings they are to be put. In modern work, steel joists are generally used instead.

Ground Joists and Sleepers.—Give the scantlings; if they vary in different parts of the building, state where those of each scantling are to be put.

Floor Joists.—Specify as described for ground joists; if any are to be fitted to steel joists, a general note to this effect will suffice. Mention here any solid bridging or herring-bone strutting required, giving details both of size and spacing.

Roofs.—Give the scantlings of all timbers; and refer to the drawings for method of construction. Describe here how joints in ridges, purlins, etc., are to be effected, and if ends of rafters, etc., are to be wrought. Ceiling joists can be included in this clause.

Roof Trusses.—Give the scantling of all members, and state if the trusses are "King post," "Queen post," etc. Although the ironwork in trusses really belongs to the trade of "Founder and Smith," it is as well to describe it here.

Joists to Flats.—Give the scantlings of these.

Framed Partitions and Ashlaring.—Give the scantlings of all members.

Roof Coverings.—Boarding, battening, and counter-battening should be described in detail, and in the case of battening, mention should be made whether for slates or tiles, as the spacing varies accordingly. When roof boarding is exposed at the eaves and verges and is wrought, this should be described. For felting, describe clearly what type is required, the width of laps and method of nailing: it is advisable, as a rule, to specify a good proprietary article.

Boarding for Flats and Dormer Tops.—State the thickness ; and if required to be on firrings, describe as such. State also whether it is for, say, asphalte or lead : if for the former it need not be wrought, but if for the latter it should be described as “ traversed for lead ” or “ with edges shot and wrought for lead.” Rolls and drips for lead flats may be described in this clause, and their sizes should be given.

Boarding to Dormer Cheeks, etc.—In the case of lead-covered cheeks to dormers, etc., describe the boarding as given for lead flats.

Gutter, Valley, and Lier Boards, and Gutter Sides.—State the thickness of each ; state if gutter boards are to be on bearers, and if these are to be framed. The positions of gutters should be indicated and any cesspools fully described. Mention the provision of the necessary gussets, drips, and rolls.

Tilting Fillets.—Give sizes of tilting fillets if over $2 \times 1\frac{1}{2}$ ins., and state where these are to be placed.

Eaves Fascias.—Give sizes and describe fixing and all labours.

Fixing Fillets, etc.—Mention the provision and building in of these for fixing internal door frames, etc., if these are preferred to breeze fixing blocks ; and also the necessary plugging of brickwork for fixing framings, etc.

Barge Boards.—Give the sizes of these, and describe the fixing, all labours (including the finish—the surfaces are sometimes adzed, in the case of oak), and any mouldings planted on, returned ends and finial posts at apices.

Half-Timber Work.—Very elaborate descriptions for this type of work are of little value, since detail drawings will convey a much truer idea of what is desired, than many pages of descriptions, no matter how well written. Descriptions should therefore be limited to the sizes of the various timbers, the method of framing (including the sizes of the pins and the amount of their projection from the face of the work, if this is the method to be employed), and the finish of the surface ; and reference should be made to the detail drawings for all other particulars. The treatment of half-timber work by the application of hot lime can be included in this clause ; but if paint or oiling is intended, it should be described in “ Painter.”

Floors.—For boarded floors, give the thickness and an indication of the widths of the boards ; describe the joints (both longitudinal and heading) and the fixing ; and state if

they are to be well cramped up and cleaned off at completion. Give widths and thicknesses of mitred borders to hearths—these are generally described to be glued.

Block floors are often specified at a p.c. price per yard super laid complete, mention being made if this sum includes mastic composition, or if it has to be provided by the general contractor. The cement screed has, almost invariably, to be provided by the general contractor, and is described in "Plasterer." If no p.c. price is given, describe the sizes of the blocks, how they are to be fitted together (*i.e.* with dovetail grooves or otherwise), the pattern in which they are to be laid, the border, and if to be laid in mastic. The above remark regarding the cement screed also applies here.

Parquet flooring is practically always the subject of a p.c. price, but it should be made clear how much this price covers, as some firms include for the counter floor and some do not. In the latter case, the counter floor should be described as given for boarded floors, with the statement added that the same is to receive parquet flooring.

Skirtings.—Describe the thickness, height, and labours, and state whether or not on grounds and backings, and if plugged to brickwork, fixed to partition, etc.

Chair Rails, Picture Rails, Cornices, etc.—The notes above for skirtings apply to these items and all similar work.

Wall and Ceiling Boarding.—Give thickness, width of boards, description of joint, and method of fixing, *i.e.* whether fixed to timbers or on grounds and backings plugged to wall or otherwise.

Panelled Framings.—Give the thickness and the number of panels in height, and describe as "moulded and square," "bolection moulded both sides," etc., as the case may be: and describe with the items such additions as cappings, chair rails, and skirtings, giving the particulars mentioned above, and stating if they are tongued to the framing, planted on, etc. Doors in framings can usually be included in the description, mention being made of the number of panels in each. If any panels in the framing are to be glazed, include them and also the glazing beads in the description, stating if the latter are to be fixed with brass screws and cups: the glass itself will be described in "Glazier."

Wall panelling should be described similarly to the last, except, of course, that the treatment of the panels will be on

one side only. Describe with the item the grounds and backings, and the plugging of same to walls.

Doors.—There are two main methods of specifying these, both of which examples are given at the end of the book; and there can be sundry slight variations of these according to the individual tastes of different architects. The first of those mentioned above, and the class in most general use, can be described as grouping together doors of similar characteristics, as regards the doors themselves and their frames or linings, architraves, ironmongery, etc., stating where they are to be placed and writing the descriptions in prose, as has been shown in the clause previously written. The second method, which should only be used where the descriptions are fairly simple, is to specify them in tabulated form, with headings such as : "Position," "Thickness," "No. of Panels," "Frame," "Lining," etc. In the former case, for the sake of ease in picking out items, it is advisable to have different clauses for external and internal doors, and also for each kind of timber used in the construction of the doors themselves, where, as sometimes happens, doors are constructed of two kinds of timber (*e.g.* a door may be oak on one side, to match the joinery in, say, the dining-room, and mahogany on the other, to correspond with the joinery in the hall), these should have a clause to themselves. In the latter case, the headings will provide for all eventualities.

The sizes of doors are not often given in the specification, as a matter of fact (though this, again, depends entirely on the architect who is preparing it), this particular being left, as a rule, to the detail drawings.

However, whatever method is adopted, the following particulars should be given or described : position ; thickness of door (in the case of ledged or ledged and braced doors, the thickness of the boarding and the total thickness of the door should be given) ; number of panels and treatment of same on each side of the door, or described as "ledged and braced" or otherwise, as the case may be ; size of frame or thickness of lining, and all labours on either. The width of the last will be determined by the thickness of the wall in which the doorway is placed, but mention should be made of the backings and size of stop (if any) ; the size of the architrave on each side of the opening and whether same is chamfered, moulded, or otherwise treated, and the sizes of plinth blocks (if any) ; and

descriptions of all ironmongery, generally accompanied by p.c. prices, except in the case of butts. Fanlights over doors, together with the transomes under them, should be included in the description: the notes on casements in the following clause will apply to the former; for the latter, describe as given for frames.

Windows.—There are two main types in general use—casements with solid frames and balance hung sashes with cased frames.

In specifying the former, give the thickness of the casements, the finish (*i.e.* whether square, chamfered, or moulded), the number of squares into which each is divided, and the width of the bars if this exceeds $1\frac{1}{2}$ ins. If the heads are to be shaped, or if there are any other special features, it is as well to refer to the detail drawings. Furthermore, state whether casements are to be fixed or hung; and if the latter, say whether top, side, centre, or bottom hung; and if the bottom edges are to be splayed or rebated; also, describe all ironmongery, given above for “Doors.” Describe in detail the frames, mullions, transomes, and sills, *i.e.* give sizes and describe all labours. Angle frames and mullions, where of irregular shape, are generally described as being “out of in. \times in.,” giving the least section from which they can be cut. For balance hung sashes with cased frames, the notes given above for casements apply generally to the sashes themselves, except that in this case they can only be either single or double hung; and further, that it is necessary to add to the description such items as moulded horns, and that the meeting rails are to be either “splayed” or “rebated.” Describe the sills as given in the last paragraph, and give thicknesses and full descriptions of all parts of the casings or boxings—in other words, of the cased frames. The woodwork having been disposed of, turn attention to the lines, pulleys, and weights, for all of which it is an additional safeguard to specify a particular make: other ironmongery, such as sash fasteners, should be described as before.

Windows of this last type, which are in more than one light and divided vertically, can be further described as “in No. lights with cased mullion (or mullions) to match frames.” In the case of those divided horizontally by a transome, describe the transome as previously given, and describe the upper light (which is usually in the form of a fanlight) as given for casements.

In all cases, the positions of windows should be given, so that they can be identified easily on the drawings.

As for the finishings, give thicknesses of linings, window boards, and nosings (the widths will be governed by the same factors as are mentioned with regard to door linings), and describe all labours, backings, bearers, etc., as required. Architraves will be described as given under the heading of "Doors," and bed moulds should be similarly described, the one particular point of these being that they are usually tongued to the underside of the window board or nosing. Describe also how the ends of window boards, window nosings, and bed moulds are to be finished off.

Lantern Lights.—It is a moot point whether these should be treated as "Wrought Carpenter's" work or "Joiner's" work, *i.e.* whether they should be specified at the end of the carpenter's work or among that of the joiner. As long as they are described, however, the position is not important, and the description will be the same in either case.

Give the scantling of the curb, stating if it is to be wrought, and describe the sill, frames, mullions, head and sidelights as given for casement windows. Give sizes of ridge, hips, ridge and hip rolls and glazing bars; and describe all labours on them. The glass will be described in "Glazier," as will any part which is to be constructed of any patent system of glazing and glazing bars.

Window Backs, Folding and Sliding Shutters.—Descriptions for these can be easily worked up if the notes contained in the clauses devoted to "Framings," "Doors," and "Windows" have been assimilated.

Cupboard Fronts.—If panelled, describe these as given for "Panelled Framings." If otherwise, describe as "beaded," "matched and beaded on 3 × 2 ins. quartering," etc., as the case may be; and describe the doors, as previously shown, and any other particulars such as plinths or cornices.

Shelving.—State the thickness and describe as wrought, one or both sides as the case may be, and mention if it is required to be cross-tongued. In the case of lattice shelving, give the size and the distance apart of the laths. Bearers and supports generally can be described with the items: in ordinary cases, the addition to the description of the shelving of "on chamfered bearers, plugged to walls (or otherwise fixed)" is sufficient, but where anything more elaborate is intended, the

sizes of the members should be given and they should be described as "framed." In all cases, the number of tiers of shelving in any particular position should be given.

Dressers.—The day is gone when dressers were constructed to a stock pattern, the description of which, with very slight variations, would answer for fully 90 per cent. of the dressers made. There are firms who sell dressers which are, to all intents and purposes, highly finished pieces of furniture, and if something of this kind is intended, a p.c. sum will provide all that is necessary in the specification, as the variety of those made is legion. If, however, it is the intention of the architect that a joiner-made article should be installed, full particulars of each component part should be given: these vary so much in different designs, that no good purpose would be served by going through them here, but a reference to the example given at the end of the book will show what is meant.

Staircases.—In specifying staircases, the most important points to be mentioned are undoubtedly the sizes of and labours on the individual members. The space in the building assigned to a staircase, combined with the heights of the storeys, will govern its plan; therefore the general principles of its construction, and with the above-mentioned information in hand, the builder can get his materials ready. Detail drawings of all staircases should always be available, and for any further information, these are worth more than pages of descriptions.

Where more than one staircase is to be specified, keep the descriptions of these entirely separate, if, as generally happens, the component parts are in any way dissimilar. This rule may sometimes be modified by referring from one paragraph to a previous one, giving particulars of the exceptions in the fresh paragraph, and stating in it that the remainder is similar to what has been described in the last; but, generally speaking, it is a sound rule to follow.

Bearing the above remarks in mind, commence with the proviso that the staircase (or staircases) are to be constructed in accordance with the detail drawings: then continue with descriptions of the members, of which the following notes give the most important of the particulars which the builder will want to know.

Give the thicknesses of the treads and risers, describe the nosings, state if risers are tongued one or both edges, and if

the treads and risers are to be "glued, blocked, and bracketed" on fir carriages: for ordinary domestic staircases it is usually sufficient to describe the last merely as "strong," leaving out their size and number; but for bigger work both these particulars should be given. Give full details of any particular finish to individual steps, such as rounded ends and veneered risers to bottom steps. Winders and risers should be described as given for treads and risers, except that winders are generally cross-tongued at their wide ends, and should be described as such. Specify landings which are part of the staircase itself by giving the thickness, describing them as "cross-tongued," and stating that they are to be on fir bearers: the above remarks on fir carriages apply also to these last. Give the thicknesses of and describe all the running labours on wall and outer strings, stating how the former is fixed to walls; the width of these need not be given unless they are required to be wider than is actually necessary; outer strings over which the treads run should be described as "cut." If the strings are to have cappings, give sizes and describe labours: those for wall strings are usually rebated, and those for outer strings grooved on the underside to receive same, and should be described as such. Describe apron linings in the same way as given for strings, and include with same the nosing (if any), giving the size and describing it as tongued to edge of landing or floor, as the case may be. Describe the skirtings on landings as given in the clause on "Skirtings." Give the sizes of all newels and describe the labours; it should be noted that in the case of a newel of which a portion bulges out beyond the base, the size to be given is that of the newel at its greatest section, as this is the size of the timber from which it will have to be cut. Where caps and pendants to newels are worked on the solid, describe their finish and give their height; where these are applied, give full particulars, both as to size and finish, and describe how they are to be fixed to the newels, *i.e.* whether they are to be sunk on the underside and fitted over a dowel on the newel, or to have dowels worked on them or any other method preferred. State the size of the handrail and describe as "rounded" or "moulded" as the case may be, and mention any particular features such as scrolled ends; handrails fixed on wall brackets are sometimes grooved on the underside to fit over an iron core, and this fact, if intended, should be stated. The wall brackets should also be described

here. The balusters should be described very much on the lines given for newels, but for these it is as well to give the length or lengths, and to state if they are to be set anglewise or square.

The main items have now been dealt with, and it remains only to mention such things as housing and pinning ends of treads and risers to strings, housing and pinning ends of strings and handrails to newels, framing balusters to strings or treads and handrails, and cross-tongued heading joints between wall strings and skirtings. All these can be described either with the items to which they belong, or together at the end, according to preference; and, indeed, no great harm will be done if they are omitted altogether, as the staircase cannot be constructed without their due performance; but provided that clarity is not sacrificed thereby, it is, perhaps, as well to err on the side of fullness of descriptions rather than to be too brief.

Framings under staircases are generally specified with them, and should be described as previously given in the clause devoted to them.

Ironmongery.—This, as has been shown, is described, for the most part, with the items to which it is fixed. To save constant repetition, however, iron tongues (or water bars) in sills and thresholds can be given a clause to themselves, giving the size, stating whether galvanised or not, if bedded in the grooves in white lead, and describing them as being for all sills and thresholds.

There are, of course, innumerable other items which belong to the trades of carpenter, joiner, etc., concerning the specifying of which, much might be written. The aim of this book, however, is to give, in a concise form, general principles for specifying building works in such a way that they can be adapted to the case in hand; therefore, in this chapter, which deals with what is often the largest trade in a specification, notes have been given only on those items which are most commonly met with; and if these notes have achieved their object, they will have been sufficient guide for building up descriptions of all other articles which the carpenter or joiner may be called upon to construct.

CHAPTER VIII.

FOUNDER AND SMITH.

It was formerly customary to commence either this trade as a whole, or else each section of the trade with very lengthy descriptions, not only of the materials themselves, but also of the various tests to which they might be subjected, according to the architect's discretion, and be required to pass. This has been found, in practice, to be quite unnecessary. Structural cast ironwork is practically a thing of the past, so that little cast iron is ever used on a building except in the form of rain-water goods; and a very short clause is usually sufficient to safeguard the quality of these. (By the way, in this book the South Country custom of including rain-water goods in this trade is being followed: in the North, they are usually put in "Plumber.") The average wrought-iron articles in a building can usually be safeguarded as to quality by quite a small clause, while a reference to the British Standard Specification for Structural Steelwork is now judged sufficient for even the biggest of steel-framed buildings. The following notes, therefore, should cover all that can be required.

Materials.—Describe the cast iron as being of the best grey metal and free from sandholes, flaws, and all other defects.

Describe the wrought iron as being the best Staffordshire (or other approved). It is as well also to state quite clearly such points as: that heads of bolts are to be screwed and welded on, etc.

Describe the steel as being capable of complying with the requirements of the British Standard Specification.

These can, of course, be elaborated if it is desired, and notes can be inserted concerning such points as that "rivets are to be capable of being bent double either hot or cold without cracking," etc., but under ordinary circumstances the three short notes given above should suffice.

CAST IRON.

Rain-water Pipes.—Give the size, and state whether round, square, or otherwise. If they are to be “heavy,” describe them as such, or give the thickness of the metal. If they are to be of any special make, the maker’s name and his catalogue number should also be mentioned, together with a prime cost or list price. These particulars having been given, describe how the pipes are to be jointed, and how fixed to the various kinds of wall surfaces, and state that all necessary swannecks, bends, knees (over plinths), shoes, etc., are to be provided, those of unusual shapes being “purpose made” if required. If any special bands or holderbats are to be used in the fixing, these should be described in detail or else the maker’s name, etc. (as shown above for the pipes) given; and the same remarks apply to rain-water heads, unless they are quite simple, when a prime cost or list price alone is sufficient. If pipes and heads vary for different parts of the building, describe fully the different kinds, and state clearly where they are to be put.

Eaves Gutters.—As shown for rain-water pipes, give the size and shape, *i.e.* whether moulded, half-round, or otherwise. State if they are to be “heavy” or, alternatively, give the thickness of the metal: and if they are to be of any special make, give the same particulars as shown above. In the case of half-round gutters, describe fully the brackets, and how, to what and how far apart they are to be fixed. Most other kinds of gutters will be fixed direct, *i.e.* either screwed to fascias, bedded on cornices or boundary walls, or fixed otherwise as the circumstances may demand, but in all cases full particulars should be given and the method of jointing described. State that all stopped ends, outlets, angles, etc., required are to be provided and are to be “purpose made” if required. Different types of gutters for different parts of the building should be separately described, and their positions stated.

Railings.—The use of cast-iron railings has lapsed from favour almost entirely, even for town or suburban houses, during the last thirty years; but where these are required they are usually proprietary articles, so give the maker’s name and catalogue number, together with a p.c. or list price if possible, and state the positions where they are to be fixed. Letting in and leading ends in stone copings or brickwork are described in “Mason” or “Bricklayer.” If they should be of a special design, either

refer to the detail drawings or else obtain a price from some founder and include it as a p.c. sum, the mason's or bricklayer's work being dealt with as before described.

Gratings, Ventilators, Stoves, etc.—The remarks for the foregoing "cast-iron" items can be adapted to practically all other articles in cast iron which are likely to be required. In the case of stove, a lump sum is often inserted for the whole lot, but in this case the number of stoves which it is to cover should be given, particularly if there are to be no quantities, so that the contractor may know what is required in the way of carriage.

WROUGHT IRON.

Chimney Bars.—Give the size, state that they are to be built in under chimney arches, to be cambered and to have the ends split and turned up and down.

Gratings, Railings, and Gates.—If these are simple in design, give the over-all dimensions (in the case of railings the height alone will be sufficient, as the position will determine the length) and describe in detail the component parts: it is generally advisable to refer to the detail drawings, but this can sometimes be dispensed with. For those of more elaborate or ornamental designs, reference should certainly be made to the detail drawings, while for very elaborate designs it is generally better to give p.c. prices, either in the form of lump sums or else per foot run for railings, and each for the other items. Ends let in, etc., are dealt with as previously described. In all cases, of course, the positions in which the various articles are to be fixed should be stated.

Plate Corbels.—Give the weights of these and describe where and how far apart they are to be fixed.

Bolts, Straps, etc.—These are generally described in "Carpenter," and it is sufficient to say here "supply and fix the bolts, straps, etc., as described in 'Carpenter.'"

Iron Staircases.—These are usually the subject of a provisional sum: state if this sum includes the fixing and the contractor is only to attend on the erectors or if the contractor is to fix; the former condition is generally the case.

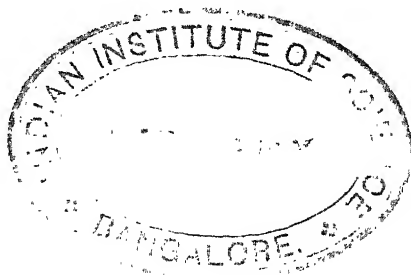
Iron Casements and Windows.—These also are usually treated best as the subject of a provisional sum, and the remarks regarding fixing as given above for staircases also apply here.

Corrugated Galvanised Iron Roofing.—Give the gauge and the length of the sheets and describe the bolts or screws that are to be used in fixing, mentioning that the holes in the sheets are to be properly punched. Describe fully all such accessories as ridges and hips and their fixing.

CONSTRUCTIONAL STEELWORK.

Rolled Joists.—Give the sizes and weights of all rolled joists to be used, defining their positions clearly, and describe any connections in detail.

Riveted Girders, Roof Trusses, and Stanchions.—Describe the component parts in detail, together with methods of construction, and give particulars of positions and connections as before.



CHAPTER IX.

PLASTERER.

UNDER the heading of "Materials" it is quite usual to include only those ingredients which go to make up what may be described as ordinary plaster, Portland cement, Keene's cement, and any other particular kind of plaster being given as headings of sections in the trade: and this method is the one followed in the ensuing notes. Specimen descriptions are to be found among the examples at the end of the book, but the architect must use his discretion as to varieties of the component parts of his plaster, as some of these depend not only on his personal preference but also, and to quite a large extent, on the district in which the work is to be carried out.

INTERNALLY.

Materials.—Describe the lime fully, both as to variety, condition, and properties; and to ensure that it will not make the plaster "blow," add some such statement as: "to be run into putty at least one month before being used."

Denote any particular form of sand preferred, but whatever it is, lay down that it is to be sharp, clean, and free from any trace of salt. Alternatively reference can be made to the description of sand in "Excavator, etc."

The essential points with regard to hair are, that it shall be long and well beaten and plentifully used in the coarse stuff; it is quite a good scheme to give some idea of the proportion of hair to mortar which is required.

Full descriptions can be given, of course, of the proportions of the various ingredients to be included in the make-up of coarse stuff (or rendering), floating and setting coats, but this is scarcely necessary where tendering is by chosen contractors.

As for laths, describe the material, how they are to be jointed (butt jointed, for instance), what kind of nails are to be used, and give the thickness—generally "lath and a half."

In the case of metal lathing, either give a gauge or mention some proprietary article: to describe it as "strong" is rather vague, but if there is not a great deal to be used this may be sufficient. If there is any concrete to be plastered, it curtails the later descriptions to say here that all concrete which is to receive plastering is to be hacked to form key.

Walls and Partitions.—These can usually be covered with a very short clause, such as: "render, float, and set all walls and slab partitions not otherwise described." Slab partitions are sometimes treated with two-coat work only, *i.e.* the floating is omitted, and if this is intended describe as "render and set slab partitions." The treatment of stud partitions and ashlaring should figure as "lath, plaster, float, and set stud partitions and ashlaring not otherwise described."

Ceilings and Beam Casings.—Concrete ceilings and beam casings are usually treated with three-coat work, and should be described as shown above for walls: describe ceilings to underside of wood joists, as shown above for stud partitions. Plaster beam casings on fir cradling sometimes are on wood lathing, but in modern times are more often on metal lathing, which should be described with the item if the bulk of the lathing is wood.

External Angles.—These need be mentioned only if they are to have any particular finish beyond the ordinary arris.

Cornices, Ceiling Ribs, etc.—Describe these as being in fine plaster and to be dubbed out, give the girth and, generally speaking, describe the moulding as being to detail. Define the positions of the different sizes, and say how many different patterns for each size will be required.

Enrichments.—These are usually executed in fibrous plaster and are frequently the subject of a provisional amount. If they are to be further described, they should be dealt with on the lines given for "Cornices."

Generally.—Describe how old walls which are to be plastered are to be treated, *i.e.* whether hacked or joints raked out, and wall drenched or otherwise, and how junctions are to be effected between new and old plaster. Mention such things as lathing and counter lathing wood beams and posts which are to be plastered.

Keene's Cement.—If this is to be of any particular manufacture, describe it, and also state if it is to be on a backing of coarse Keene's cement or Portland cement. Then, following

the assumption mentioned at the beginning of the trade, that the bulk of the plastering is to be in ordinary plaster, give a list of those features which are to be executed in Keene's cement, such as: all external angles, window reveals and soffites, skirting (giving height and any labours) in etc.

There are a good many patent plasters on the market, each of which has its band of devotees; and if one of these is to be used, it is as well to find out beforehand the number of coats in which it is applied and then to state this number and that the plaster is to be used "according to the directions of the manufacturers."

Portland Cement.—For the quality of this, reference can be made to that specified in "Excavator, etc.," the sand has already been dealt with in this trade. As the items inside a building executed in this material are usually confined to rendering, skirtings and beds for tile wall linings and tile or wood block floors (cement floors are described in "Pavior"), this can be disposed of quickly. Always give the positions of the various items; state proportions of cement and sand, the thicknesses of all and the finish; and for skirtings (and dadoes) add the height and any labours.

Tile Wall Lining.—Describe the tiles fully or specify a maker, and, preferably, a p.c. price per yard super, stating what this price covers, *i.e.* tiles at station, delivered to site, or fixed complete as the case may be. Then describe how the tiles are to be pointed, and finish with descriptions and/or p.c. prices per foot run of cappings, skirtings, coves, angles, etc., explaining clearly which rooms are to be tile lined.

EXTERNALLY.

Plasterer's work under this heading is so immensely varied in nature and so many architects have their own pet ideas on the subject, that however many different types were mentioned, the student would probably find that the particular one for which he was searching was missing. It is proposed, therefore, to give notes of a few of those most generally in use only, in the hope that from these, others may be built up as required.

Plain Face Rendering, Cornices, etc.—These are usually executed in Portland cement and can all be described on the lines given for similar work internally. If mock joints are to be made on the surfaces in imitation of stone, describe them

and their distances apart. Work treated in this way, however, is now generally executed in one of the many patent cements which claim to imitate closely some particular stone ; and if one of these is to be used, full particulars should be obtained from the manufacturers before a detailed specification of the item is attempted.

Stucco.—As this is generally intended to be either painted or distempered, the surface must be smoother than that of ordinary rendering, therefore the component parts must be finer. Give the thickness, describe the component parts and the finish of the surface, and add particulars as to method of execution as desired.

Rough Cast.—This item alone covers a multitude of different processes, but practically all have this one point in common, *viz.* that the first operation is a rendering of Portland cement. The finish may consist of a coat of lime and fine gravel mixed with a small quantity of Russian tallow and some colouring pigment such as yellow ochre, or a coat of lime stucco on to which clean washed pebbles are thrown, or the pebbles may be thrown on to the rendering direct, to mention only three varieties ; but whatever form the rough cast is to take, the architect should have no doubt as to what he requires, and should so word the specification that he leaves no doubt in the minds of the quantity surveyor (if there are to be quantities) and the contractor.

CHAPTER X.

PLUMBER.

It is customary to specify this trade in two separate and distinct sections, the first dealing with what may be termed, broadly, as lead in sheets ; and the second with what may be termed, equally if not more broadly, as lead in pipes. These two sections usually appear in a specification under the headings of "Externally" for the former and "Internally" for the latter. These headings do not indicate quite literally what the sections cover, as soil pipes, though generally fixed outside a building, are included with internal plumbing ; but they are close enough for all practical purposes, and a perusal of the following notes should provide the student with an idea in skeleton form which he may clothe according to the necessities of the particular work which he is specifying.

EXTERNALLY.

Materials.—Describe the lead as being "cast" or "milled"—generally the latter, owing partly to its more even thickness, but chiefly to its being less costly—as the case may be, and state that it is to be of even thickness throughout and of the full weights specified.

Where the job is not to be advertised for tendering, this should be sufficient description, it being taken for granted that a contractor who cannot be trusted to a certain extent is not invited to tender. If, however, the tendering is to be open, it is as well to mention such things as that sheet lead is not to be laid in longer lengths than 10 ft. ; that all necessary solder, copper nails, lead tacks, etc., required in laying the leadwork are to be provided ; that all necessary labours such as welting edges are to be executed, and that no solder is to be used except where absolutely necessary. Further, it might be stated that the architect reserves the right to take, at his dis-

cretion, samples of lead of various weights from that on the site.

Note.—The following clauses or notes for sheet-lead items are deemed to be sufficient descriptions under the conditions mentioned at the beginning of the last paragraph ; unless the architect has strong views on the subject (noted hereafter) and wishes to enforce them : but, if the tendering is to be open, it is an additional safeguard to specify in detail all such things as the amount of fall in a 10 ft. length of flat or gutter ; the amount of turn up at the edge of a flat against a vertical face ; the amounts of turn up under slates or tiles of lead flats or gutters ; the widths of lead valleys and cover flashings, etc.

Flats.—To specify these, merely give the weight of the lead to be used. If more than one weight is to be used, specify clearly which weight is to be used on which flat.

Gutters (including Cesspools), Valleys, Cover and Stepped Flashings, Aprons, Dormer Flats and Cheeks, and Coverings to Hips, Ridges, and Turrets can all be specified by stating only the weight of lead to be used.

Soakers can also be specified in a similar way, but some indication should be given of their positions, *i.e.* whether to hips or against vertical faces, skylights, etc.

Strips of lead built in over openings in hollow walls, bedded under edges of asphalt flats, etc., should be described fully, the widths, weights, and any particular dressing being stated.

INTERNALLY.

Quite the most important part of a specification for internal plumbing is the preamble ; and perhaps the most important part of the preamble is that which shall ensure the works being carried out in accordance with the local water company, or the Metropolitan Water Board, as the case may be.

The bulk of the pipes to be used are generally of one material, and this can be stated in the preamble, together with the method of fixing. In the case of lead pipes it is unwise, as a rule, from the architect's point of view, to specify weights for different sizes of pipes : this is because the weights allowed in different localities vary enormously. In Liverpool and Newcastle-on-Tyne, to mention two outstanding examples, the weights required by the local water authorities are far in excess of those required by the Metropolitan Water Board. In any case, why commit oneself unnecessarily ? The architect is covered by

the clause stating that the work is to be in accordance with local regulations, and the contractor has as good an opportunity—if not a better—of finding what is required as the architect. The most that need be stated is such a proviso as “service pipes are to be heavy, wastes and overflows middling.”

The next point is to give a general description of the brass-work, and if it is to be “stamped,” state the fact.

Fittings need not be described here (by “fittings” is meant baths, etc.), as these are generally treated more satisfactorily as p.c. items.

The next clause should cover the connection to the company's main; and any watching and lighting in roadway, together with risks in connection therewith; and making good roadway and path, to the satisfaction of every one concerned.

The above notes point out all that is absolutely necessary in a preamble for internal plumbing, though they can, of course, be elaborated according to desire. Specimen clauses will be found at the end of the book.

Now for the actual work itself, to describe which it is essential that one should, first of all, have a very clear idea in one's mind of the plan of the building, and so be quite certain where the pipes are to run. Having done this, describe the work in the order in which one imagines it will be carried out, something on the following lines and in narrative form. (See examples at the end of the book.)

Rising Main.—Give the size of this, and if any part is to be in ground, give the minimum depth at which it is to be laid.

Note.—In the following clauses “describe” can, in all cases, be held to include “give the size.”

Ball Valve.—Describe the ball valve which finishes the rising main, together with its connection to main and cistern.

Cistern.—Describe the main storage cistern (or cisterns), giving the capacity in gallons, and state where it is to be fixed. If there are more than one and they are connected, describe the marrying piece (or pieces), and how it is connected to the cisterns. Describe the overflow to the cistern in this clause, including where it is to discharge.

Safe to Cistern.—Give the weight of the lead covering of the safe, and describe the woodwork in detail, together with the overflow pipe to the safe, how it is connected and where it is to discharge.

well to describe this in this trade (although, of course, it will be executed by a carpenter or joiner), to facilitate matters in settling up a job.

Branches off Main.—Supplies, such as those for drinking water, which come direct from the main should be described separately. Describe the pipes, state in what position they are to be connected to the main, where they are to run, and describe the bib valve with which they are to be finished.

Services.—All services except those described in the last clause have usually to come from the main storage cistern. No set lines can be laid down for describing these. In any case, describe the pipe connected directly to the cistern and give a point in the building which is the limit of its extent in one size ; then describe the various branches from this pipe, treating any continuation of the main down pipe in another size as a branch, and name the sanitary fittings which they are to serve. The fittings themselves, to save confusion, are best described in a separate clause.

If there is more than one down pipe from the cistern, treat each and its branches as a separate system.

Stop Cocks.—Describe these and give their positions. Give details of the iron boxes and brick settings of those outside the building.

Bib Valves.—Where these are not included with the sanitary fittings, describe them, and state over which fittings they are to be placed.

Sanitary Fittings.—To describe these in great detail is generally unnecessary : it is usual merely to name the item, and give its p.c. price ; but in all cases the fixing should be described, that is to say, the materials of which the wall or floor to which it is to be fixed should be stated, and in the case of a W.C. apparatus, the back board (which is not often included for in the p.c. price), should also be described.

Wastes and Overflows.—Describe all traps, wastes, and overflows, state to what fittings they belong, and where they are to discharge ; and describe such things as copper flaps to overflows, cleaning caps to traps, and trunk wastes with the items. Down wastes from upstairs fittings can be put in this clause, and the description should include the heads and shoes, and how they are fixed to walls.

Flushing Pipes.—Describe these as given for wastes above ; and include connections to pans in the description.

Soil and Vent Pipes.—Describe these fully, giving the methods of fixing to walls and connecting to W.C.'s, etc. In the case of vent pipes, include the domical wire grating at the top, and all such items as holes through eaves, and making good roof.

Connections of Ground Floor W.C.'s and Vent Pipes to Drain.—It is a moot point whether these belong to the "Plumber" or the "Drainlayer," but as long as they are fully described in one trade or the other, it matters very little which.

Wrapping Pipes.—State what pipes are to be wrapped, with what material, and how it is to be fixed.

Draining Boards.—State the material to be used, give thicknesses of same, and describe the fluting and finish to edge around sink. Describe the bearers, giving sizes and labours, and state how they are to be fixed. Skirting, etc., to draining boards should be described here.

Holes for Pipes, etc.—The remarks in the clause on "Cistern Casing" applies to these and similar items, such as chases in walls for pipes, in that they will not be executed by a plumber; but in actual practice it has been found more convenient from the architect's or surveyor's point of view to mention them in this trade. It is not necessary to go into detail, and it will be found sufficient to state that all necessary holes are to be cut or left and walls made good on both sides. In the case of chases, since these are not likely to be required all over the building, it is as well to state where they are.

Heating and Hot-Water Installations.—These have become so much the preserve of the specialist, that to describe them in detail is quite unnecessary, and a p.c. sum is generally included for this work; the builder's work can be given as shown in the last paragraph with, generally, the addition of the fixing of the pipes to the walls, etc., and the painting of pipes and radiators.

Testing.—It is generally thought to be sufficient to say that the whole of the work (*i.e.* internal plumbing and heating and hot-water installations) is to be tested at completion; but this clause can, of course, be elaborated as desired.

CHAPTER XI.

GLAZIER.

IN this trade, as in one or two others, the word "best," when used in a trade sense, does not carry its literal meaning. As a matter of fact, "best," when applied to sheet-glass in a trade sense, denotes the third of the qualities obtainable (a quality which is quite good enough for all ordinary purposes), and this should be realised when specifying. The usual description, "all glass is to be of the best quality, free from scratches, bubbles, and other imperfections, etc." (see examples at end), is quite a sound one for all ordinary occasions, provided that the above-mentioned qualifying point is borne in mind; but if the very best obtainable is really desired, it is advisable to state the quality by its trade name, which is "Picture A." (The other qualities are known as "Picture B," "Best," "Seconds," "Thirds," and "Fourth.") In addition to mentioning the quality of the glass required, describe the fixing; and also if glass in doors or framings which are likely to be shaken at all is to be bedded in wash leather or any other shock absorber.

The above remarks apply to most kind of glass (British polished plate glass, by the way, has three qualities only—silvering, best, and ordinary; the first is generally used only for mirrors) and can be put in a clause at the beginning of the trade, provided that different qualities are not to be specified for different parts of the building. If this be the case, however, the part relating to quality will have to be adapted to each individual case and written out accordingly. This, however, is a very unlikely contingency in modern practice. These remarks apply also to methods of fixing, though chances of there being different methods of fixing in one building are, perhaps, less remote.

A very simple way of specifying this trade is to have a clause for each weight or thickness of each kind of glass to be

employed. Then, unless contingencies arise such as are referred to in the last paragraph, all that need be mentioned is the particular doors, windows, etc., where this glass is to be fixed.

Lead Lights should be described quite by themselves. The simplest and most general way is to say "the following are to be glazed with lead lights p.c. per foot super fixed complete," and then give a list of the articles to be glazed. If, however, it is desired to go into detail, rather than give a p.c. price describe the lead comes and their cores (if any), the glass (as previously shown), the saddle bars, their distance apart, and fixing, etc.—in fact, give all details. It will be seen why the former method is that usually practised, and really it is every bit as good as the latter, so long as the lead lights are supplied by a firm with a reputation to guard.

Sundries.—Articles supplied glazed complete, such as lantern lights or iron casements, are best treated as a provisional sum, so long as it is clearly stated if these sums are for the articles fixed and painted complete, or otherwise.

The above notes are, of necessity, rather involved, but taken together with the examples at the end of the book, it is hoped that they will achieve their purpose.

CHAPTER XII.

PAINTER AND PAPER-HANGER.

It used to be customary to specify that all paints were to be mixed on the premises, and to describe in detail the component parts of all paints to be used, and the practise is not yet quite dead ; but modern conditions are inclined to militate against the efficacy of this method. There are two important factors which are responsible for these conditions : one is the dearth of skilled tradesmen who are capable of mixing paints—an operation requiring much more knowledge than might appear—and another is the growing use of proprietary paints and enamels, which must be used “ according to the instructions issued by the manufacturers.”

So much depends upon the individual opinion of the architect who happens to be writing the specification, that here, again, it is impossible to lay down any hard and fast rules. In the examples at the end will be found specimen specifications for this trade, which have been used successfully, to the writer's knowledge, and in this chapter it is proposed merely to deal with generalities.

Materials.—These can be all described in this paragraph or individually in the clauses in which their application is denoted. Here the first method is followed ; but if there are sundry varieties, the second method is probably clearer.

Describe the distemper to be used, together with the preparation of the plaster to receive it, or specify the proprietary article to be used.

Describe the paints for the various purposes as intimated at the beginning of this trade, or specify the proprietary articles to be used.

Note.—As a safeguard that the numbers of coats specified will be used, it is as well to state that each coat is to be of a different tint from the rest. Here might also be inserted all

such notes as regarding the necessary rubbing down between each two coats, etc.

If any work is to be stained, varnished, or stained and varnished, describe the stain and the varnish to be used, and treat any oiling in a similar manner.

A good finish with which to round off this clause is "all finishing colours are to be to the approval of the architect."

Distempering (with which is included whitening).—Denote the ceilings and walls to be distempered and state the number of applications required. If Keene's cement work is to have "one coat of sharp oil paint to follow the trowel" before being distempered, specify it here.

Painting on Plaster.—Denote all plaster surfaces which are to be painted, and state the number of coats. In this clause can be described all such items as painted lines at tops of dados, the widths of which should be given, as should also the heights of dados.

Painting on Ironwork.—This, of course, includes constructional steelwork. State how many coats the different iron and steel parts of the building are to receive, and mention such points as: that eaves gutters are to be painted inside and out, etc.

Painting, etc., on Woodwork.—Denote what woodwork is to be painted, and state how many coats are to be applied, and differentiate between that to be finished with enamel (if any) and that to be finished with paint. All staining, varnishing, oiling, and French-polishing can be dealt with in this clause, and on similar lines to those given for painting, due allowance being made, of course, for the different methods of treatment.

Painting, etc., on Old Work.—This calls for different treatment according to the condition of the article to be treated and to the amount of money to be spent; but whatever is intended should be described in sufficient detail to allow of no misapprehension on the part of the contractor, as to what is required. If old paint is to be burnt off, say so; if washing and rubbing down only is intended, be equally clear; and describe the new painting as shown before. Where old doors, to give but one example, are to be repaired and painted, and the old paint is not to be burnt off, it is advisable to state that any new work is to be brought forward with two extra coats, or as many as are required.

Lettering.—Describe the material in which the lettering is

to be carried out, and define clearly where it is to be placed, giving also the height or heights of the letters and the type of alphabet : in lieu of the last, a facsimile may be given, but in the case of a large quantity of lettering of different types, this is rather tedious.

Paper-hanging.—This item very seldom occurs in connection with new work (owing to the fact that hardly any colours are proof against the lime in new plaster), except as a sort of addenda of work to be executed some considerable time after the completion of the main contract. In this case, all that is necessary is to state the prices per piece (either prime cost or list price) of the papers to be used in the various rooms. Where dadoes occur, the heights should be given, and the prices of the papers to be used for them ; and where walls are to be panelled or treated in any other way with gimps, the price per foot run of the gimp should also be given, as should that of paper friezes, etc. In the case of panelling, some indication of the average sizes of the panels should be given, if there are not to be quantities, as otherwise the contractor has no chance of estimating the amount of gimp required. The item of varnishing papers is practically obsolete, as papers can now be obtained with a glazed surface.

Where old walls are to be papered, describe in detail the preparation of the surfaces to be papered ; and if canvas and battening is the method chosen for dealing with damp walls, it is as well to mention that the heads of all nails are to be painted and covered with strips of common paper, before the wall-paper is hung, so that there may be no chance of the heads becoming rusted and showing through. The actual paper itself should be described as previously given, and this applies also to lining paper, where this is required.

The papering of ceilings should be described similarly to that of walls.

PART II.
EXAMPLES.

CHAPTER XIII.

PRELIMINARIES.

Examples.

The Site.—The site is at the northern end of Road, on the western side, and about 100 yards from the entrance below-mentioned.

The Entrance.—The entrance for men and materials will be confined to the gate in Road.

General Conditions.—The whole of the works are to be in strict conformity with the General Conditions (which are those issued by the Royal Institute of British Architects, the quantities forming part of the contract), drawings, and this specification.

Drawings, etc.—The various drawings, tracings, details, and other documents are the property of the architect, to be used for this work only and to be returned to him on completion.

Materials and Workmanship.—The whole of the works are to be executed with the best materials and workmanship of their respective kinds, and nothing is to be omitted which is necessary for their completion in every respect. Samples of materials, colours, etc., are to be submitted to the architect for approval, before use, if required.

Implements, Carriage, etc.—All the works described in this specification are to be considered (unless otherwise distinctly specified) as new, and as being measured nett, and including all labour, waste, materials, package, carriage, cartage, risk, moving and hoisting and fixing at the required positions, also the use of all tools, implements, machinery, templates, and other matters necessary for their proper execution in all respects.

Notices and Fees.—Obtain permissions, give whatever notices, and pay all fees that may be required for any purpose relative to the works comprised in this specification, and supply all plans required by the Local or other Authorities.

Deposit Priced Bill of Quantities.—The contractor is to deposit with the architect, before signing the contract, a correct

copy of his priced bill of quantities, on which his tender is based (which will form part of the contract), and all extra or omitted works will be measured and allowed for, according to these prices as far as they apply, or at prices proportionate thereto.

Setting Out.—The works are to be carefully set out by the contractor, who is to be responsible for the accuracy of the same. Any errors made therein to be rectified at the architect's request, and any work improperly built in consequence of any error in setting out is to be taken down and rebuilt at the cost of the contractor.

Scaffolding, etc.—Provide scaffolding and other plant (including use to other tradesmen if required), sheds, tarpaulins, temporary enclosures to openings, shoots for water, lighting, watching, etc., as required by the contractor and the Authorities. The walls, during severe frost or in times of excessive wet, are to be well covered.

Latrines.—Provide latrines for the use of the workmen and keep clean, remove and disinfect and clear away same and make good at completion.

Offices.—Provide offices (2) for clerk of works and foreman, with proper brick fireplaces and flues, desks and tables with drawers for drawings, and other fittings necessary.

Foreman.—The contractor is to keep a competent foreman constantly on the works, and is to remove and replace him with another should the architect so direct.

Water.—Provide water for the use of the works, and pay all fees and water rates.

Protection of Work.—Case or otherwise protect the steps, floors, pavings, staircases, chimney pieces, etc., during the execution of the works.

Damage to Works, Fire, etc.—The contractor is to be responsible for, and to make good, all damage that may arise to any of the works from tempests, floods, fire, frost, and for all accidents on the works, of whatever description, to life and property arising out of, or happening during the construction of the works, and for anything lost, stolen, damaged, or destroyed. The contractor is to take such risks upon himself until the final completion and delivery of the works, and is to effect from the outset, in an approved Fire Insurance Office, an insurance from fire in the joint names of the architect and the contractor, and for the full amount of the contract and shall